FOREST PRODUCTS
Project Fact Sheet

INFLUENCE OF SURFACE AND SUBSURFACE TILLAGE ON SOIL PHYSICAL PROPERTIES AND SOIL/PLANT RELATIONSHIPS OF PLANTED LOBLOLLY PINE

BENEFITS

- Development of diagnostic models for determining appropriate tillage methods for various soil conditions

APPLICATIONS

Forest managers will be able to use the information and models developed during this study to prescribe proper site treatment to maximize pine-stand growth and productivity.

Understanding and Managing Physical Properties of Soils for Enhanced Pine Production

Field research that determined the cause-and-effect relationships between the physical properties of soils and subsequent growth of tree seedlings is valuable to forest managers. Although the importance of site preparation is well-recognized, there has not been a study of the relationship of the above- and below-ground response of plants to various methods of soil modification and to changes in soil properties.

Research needed includes testing the guidelines for how to minimize the impact of soil compaction, and determining the effects of tillage treatments such as subsoiling on surface and subsurface soil horizons.

This project is expected to define the ideal physical soil conditions for properly managed loblolly pine plantations.

OFFICE OF INDUSTRIAL TECHNOLOGIES
ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY

PROJECT DESCRIPTION

Goal: To quantify the relationships between the soil's physical properties and the physiology and growth of planted loblolly pines during their first two years of development.

Four combinations of surface and subsurface tillage treatments were established and replicated four times at each site. All plots were fertilized and have undergone vegetation control so that the effects of tillage on growth can be ascertained. Tasks will include 1) measurements of soil air-filled porosity, bulk density, mechanical impedance, and moisture following surface and subsurface tillage; 2) quantification of water and tree growth and the mode of tillage, during the second growing season; and 3) quantification of the relationships between the soil's physical properties and the growth and physiology of the trees.

PROGRESS & MILESTONES

- Ten field installations are in place in the Southeast to examine the effects of surface and subsurface tillage on the growth and survival of pine.
- Survival, diameter, and height of trees will be determined at the end of the second growing season, and nutrients in the foliage will be measured every two years.
- The end result should be a definitive assessment of whether pine growth can be enhanced by amelioration of soil conditions that would otherwise be limiting to stand productivity.
- Investigate the effect of temperature (200^{o}F) on elasticity and the ultrasonic signal's amplitude.

PROJECT PARTNERS

Forest Nutrition Cooperative,
Department of Forestry
North Carolina State University
Raleigh, NC

Champion International
Corporation
Roanoke Rapids, NC

FOR ADDITIONAL INFORMATION PLEASE CONTACT:

Sandra Glatt
Office of Industrial Technologies
Phone: (202) 586-3897
Fax: (202) 586-7114
e-mail: sandra.glatt@ee.doe.gov

Dr. H. Lee Allen
North Carolina State University
Forest Nutrition Cooperative
Phone: (919) 515-3500
Fax: (919) 515-6193
e-mail: Lee_Allen@ncsu.edu

Please send any comments, questions, or suggestions to webmaster.oit@ee.doe.gov

Office of Industrial Technologies
Energy Efficiency and Renewable Energy
U.S. Department of Energy
Washington, D.C. 20585

September 1998